

# MARINE ENOPLIDA (NEMATODA) FROM WESTERN AUSTRALIA

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## Summary

Ten species of Enoplida are described from the coast of Western Australia: *Anticoma cobbi* sp. nov., *Leptosomella phaustra* sp. nov., *Leptosomatium micoletzkyi* sp. nov., *Phanoderma serratum* Ditlevsen, 1930, *Paraphanoderma robynæ* gen. et sp. nov., *Enoplus meridionalis* Steiner, 1921, *E. alpha* sp. nov., *Epacanthion georgei* sp. nov., *Eurystomina eurylaima* (Ditlevsen, 1930) and *Prooncholaimus mawsonæ* sp. nov.

## Introduction

Among nematodes collected along the coast of Western Australia in 1966 and 1967, are the ten species of Enoplida described below. These species, of which seven are new, are referable to nine genera—*Anticoma*, *Leptosomella*, *Leptosomatium*, *Phanoderma*, *Paraphanoderma* nov., *Enoplus*, *Epacanthion*, *Eurystomina* and *Prooncholaimus*—of five families. The extension in the known range of these genera and the large number of new species is not unexpected. The collection's interest is that it contributes confirmatory evidence on some aspects of the general structure of marine Enoplida which was described in detail elsewhere (Inglis, 1962, 1963, 1966).

In particular the structure of the head in *Leptosomella* supports the view that the Family Leptosomatidae represents a sequence in which the cephalic ventricles are never well developed and in which oesophageal musculature extends anteriorly as a distinct lobe through those ventricles. In contrast the conditions in *Paraphanoderma* support the view that the Phanodermatidae are characterized by the presence of cuticular rods which are associated with the inner circle of cephalic sense organs. The relationships of the Phanodermatidae and Enoplidae are close and the unequal onchia in *Paraphanoderma* suggest the interesting possibility that the Enoplidae with unequal onchia originated from one group of Phanodermatidae while the equal onchiate forms arose from another. This would certainly resolve some of the problems in the analysis of the Enoplidae where at least two groups occur: the equal or reduced onchiate forms culminating in *Enoplus*, and the markedly unequal onchiate forms culminating in, or originating with, *Oxyonchus* and *Savaljevica*.

Holotype males of all new species are

deposited in the Western Australian Museum while Paratypes are in that institution and the British Museum (Natural History).

Family

## LEPTOSOMATIDAE

*Anticoma cobbi* sp. nov.

FIGS. 1-3

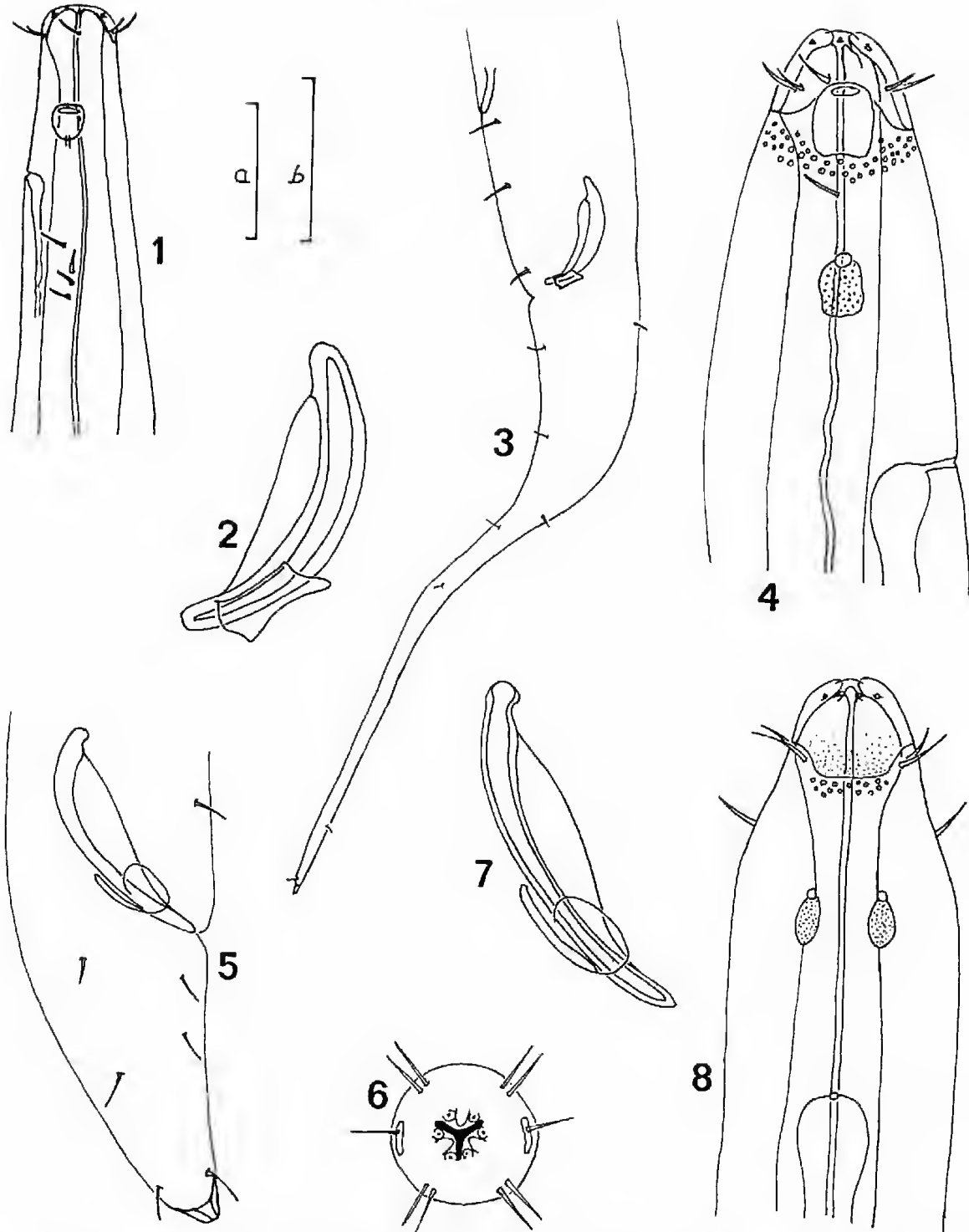
*Locality.* From among weed and bi-valves in rock pools just exposed at low tide; Hall's Head, Mandurah.

*Measurements* (mm)—*Male*: Body length: 1.82. Body breadth: 0.046. Oesophagus length: 0.342. Length of cephalic setae, long/short: 0.007/0.005. Distance from anterior end of amphid/excretory pore/cervical setae/nerve ring: 0.014/0.030/0.039/0.18. Length of spicules: 0.047. Length of gubernaculum: 0.011. Precloacal supplement, length/distance anterior to cloacal opening: 0.017/0.070. Tail length: 0.226. Cloacal diameter: 0.039.

The cephalic capsule is poorly developed and there are no onchia in the oesophastome. The sense organs form an inner circle of six, slightly thorn-like setae and an outer circle of ten long setae of which six are about a third longer than the remaining four. The excretory pore opens roughly as far posterior to the amphidial opening as that opening is from the anterior end of the body. There are four cervical setae lying posterior to the level of the excretory pore.

The tail ends in a long flagellate region and the pre-cloacal supplement is simple and slim. The spicules are fairly short and stout with narrow alae. The gubernaculum is a small, oblong mass enclosing the distal ends of the spicules. The usual series of stoutish setae lie between the cloacal opening and the pre-cloacal supplement.

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Figs. 1-3. *Anticoma cobbi*. Fig. 1.—Anterior end, lateral view. Fig. 2.—Spicule and gubernaculum detail. Fig. 3.—Posterior end male.

Figs. 4-8. *Leptosomella phaustra*. Fig. 4.—Anterior end, lateral view. Fig. 5.—Posterior end male. Fig. 6.—Head *en face*; note system of dense material surrounding nerves to sense organs and anterior lobes of oesophagus, mouth opening wholly black. Fig. 7.—Spicule and gubernaculum detail. Fig. 8.—Anterior end, ventral view.

(Scale a = 0.02 mm in Figs. 1, 2, 4, 6, 7, 8; a = 0.05 in Fig. 3; b = 0.5 in Fig. 5.)

*Discussion.* This species resembles *A. arctica* Steiner, 1916 and *A. acuminata* (Eberth, 1863) in the position of the excretory pore but differs from both in the unequal cephalic setae and the relatively short spicules with blunt posterior ends.

***Leptosomella phaustra* sp. nov.**

FIGS. 4-8

*Locality.* From weed and associated sand, without silt, on exposed beach in 25 cm water; Sarge Bay, Cape Leeuwin.

*Measurements (mm)*—*Males:* Body length: 1.85; 2.21; 2.32. Body breadth: 0.087; 0.092; 0.104. Oesophagus length: 0.494; 0.451; 0.494. Length of cephalic setae, long/short: 0.009/0.007; 0.013/0.011; 0.009/0.008. Cephalic capsule, length/posterior diameter: 0.013/0.026; 0.013/0.022; 0.014/0.021. Distance from anterior end of amphid/eye-spot/excretory pore/nerve ring: 0.011/0.036/0.063/0.175; 0.022/0.040/0.064/0.182; 0.021/0.039/0.068/0.187. Length of spicules: 0.056; 0.066; 0.058. Length of gubernaculum: 0.019; 0.022; 0.016. Pre-cloacal supplement, length/distance anterior to cloacal opening: 0.013/0.106; 0.016/0.131; 0.017/0.099. Tail length: 0.076; 0.092; 0.068. Cloacal diameter: 0.050; 0.057; 0.059. *Females:* Body length: 2.98; 3.29. Body breadth: 0.13; 0.15. Oesophagus length: 0.493; 0.548. Length of cephalic setae, long/short: 0.008/0.007; 0.008/0.007. Cephalic capsule, length/posterior diameter: 0.015/0.026; 0.016/0.028. Distance from anterior end of amphid/eye-spot/excretory pore/nerve ring: 0.013/0.043/0.057/0.183; 0.012/0.046/0.066/0.218. Tail length: 0.091; 0.096. Anal diameter: 0.069; 0.073. Distance of vulva from anterior end of body: 1.69; 1.74.

The cuticle is thick and smooth with a few long setae on the body anterior to the nerve ring but very few posteriorly until the tail region in the male and the extreme tip of the tail in the female. In particular there are two setae, between the amphids and the eye spots, which are about the same length as the cephalic setae.

The head is relatively small and the cephalic capsule is long, prominent and simple with a series of small granulations along its posterior edge which continue round the body posterior to the amphids although the capsule itself stops anterior to the amphids (Fig. 4). The amphids are prominent with elongate openings. The

mouth opening is irradiate and flanked by an inner circle of six slightly papillose sense organs. The remaining cephalic sense organs are ten setae in one circle, relatively far posterior in position, and all about the same length. Of these setae the lateral members are slightly dorsal in position.

The mouth leads into a triangular cheilostome and there are slight anterior lobes of the oesophagus lying wholly embedded within the surrounding tissue of the head. In *en face* view, there is what appears as a system of thickened rods, within each lip, of which the median rods form a distinct triangle while each nerve to the inner sense organs is surrounded by a curved rod (Fig. 6). I am unable to establish the conditions fully in view of the small size of the head but these structures appear to represent a system of dense material, seen in optical section, surrounding the nerves to the sense organs and possibly the surface of the anterior lobes of the oesophagus. They are possibly comparable to the system described by Timm (1953, 1960) and others in various members of the Leptosomatidae but they definitely do not form simple rods as in the Phanodermatidae (Inglis, 1962). In addition to these structures the dorsal wall of the cheilostome appears to be thickened to form an odontium-like structure which does not arise from the anterior end of the oesophagus.

Ocelli with lens are present. The excretory pore is prominent and leads into a very massive cervical gland which expands posteriorly over the posterior half of the oesophagus and displaces the oesophagus dorsally. In this feature the conditions agree with those described by Filipjev (1927) for *Leptosomella acrocercera* Filipjev, 1927. The oesophagus is not "cellular" in appearance posteriorly.

The tail is short in both sexes and a mid-ventral rod-like supplement is present on the male. The spicules are of an even width with distinct, slightly striated, alae. The gubernaculum is small with rounded, poorly chitinized lateral pieces. The caudal glands lie anterior to the cloacal opening or anus. The reproductive system is doubled and opposed in the females.

*Discussion.* This species appears to be most similar to *Leptosomella acrocercera* Filipjev, 1927, the type species of *Leptosomella* Filipjev, 1927, a genus to which I refer it with some reservations. The genera *Leptosomutum* Bastian, 1865, and *Leptosomatides* Filipjev, 1918 are both similar to *Leptosomella* but the latter genus appears to be characterized by setose

cephalic sense organs, an obvious excretory system and a relatively prominent, but simple, cephalic capsule. If my generic reference of this new species *L. phaustra* is correct, *Leptosomella*, previously based on female characters only, is further delimited by the presence of a rod-like precloacal supplement and ocelli. The arrangement of the structures of the head can be easily interpreted as a simple stage of the typical *Thoracostoma*-type head, for example, in which the musculature of the anterior end of the oesophagus extends anteriorly as a median block from the anterior end of each sector of the oesophagus. Thus the central triangular shape in Fig. 6 represents the outer borders of the muscle block while the remaining two spaces represent the precursors of the cephalic ventricle.

***Leptosomatum micoletzkyi* sp. nov.**

FIGS. 9-11

*Locality.* Among weed and associated hold-fasts on a rocky flat in about 10 cm water; Cowaramup Bay.

*Measurements* (mm)—*Male*: Body length: 5.0. Body breadth: 0.098. Oesophagus length: 1.03. Head diameter (posterior end cephalic capsule): 0.026. Length of cephalic setae, long/short: 0.005/0.004. Distance from anterior end of amphid/eye-spot/nerve ring: 0.073/0.11/0.29. Length of spicules: 0.083. Pre-cloacal supplement, distance anterior to cloacal opening: 0.16. Tail length 0.078. Cloacal diameter: 0.069.

The body is covered by very thick smooth cuticle on which no setae could be found posterior to about the level of the nerve ring, except on the ventral surface and the extreme end of the tail. The head is rounded and slightly set-off with an indistinct cephalic capsule. There is no mouth cavity or modification at the anterior end of the oesophagus except for a slight flange bordering the edge of the

mouth opening. The dorsal oesophageal gland opens at the level of the posterior edge of the cephalic capsule. There is an inner circle of six tiny, slightly setose sense organs and an outer circle of ten stout setae of which six are slightly longer than the remaining four.

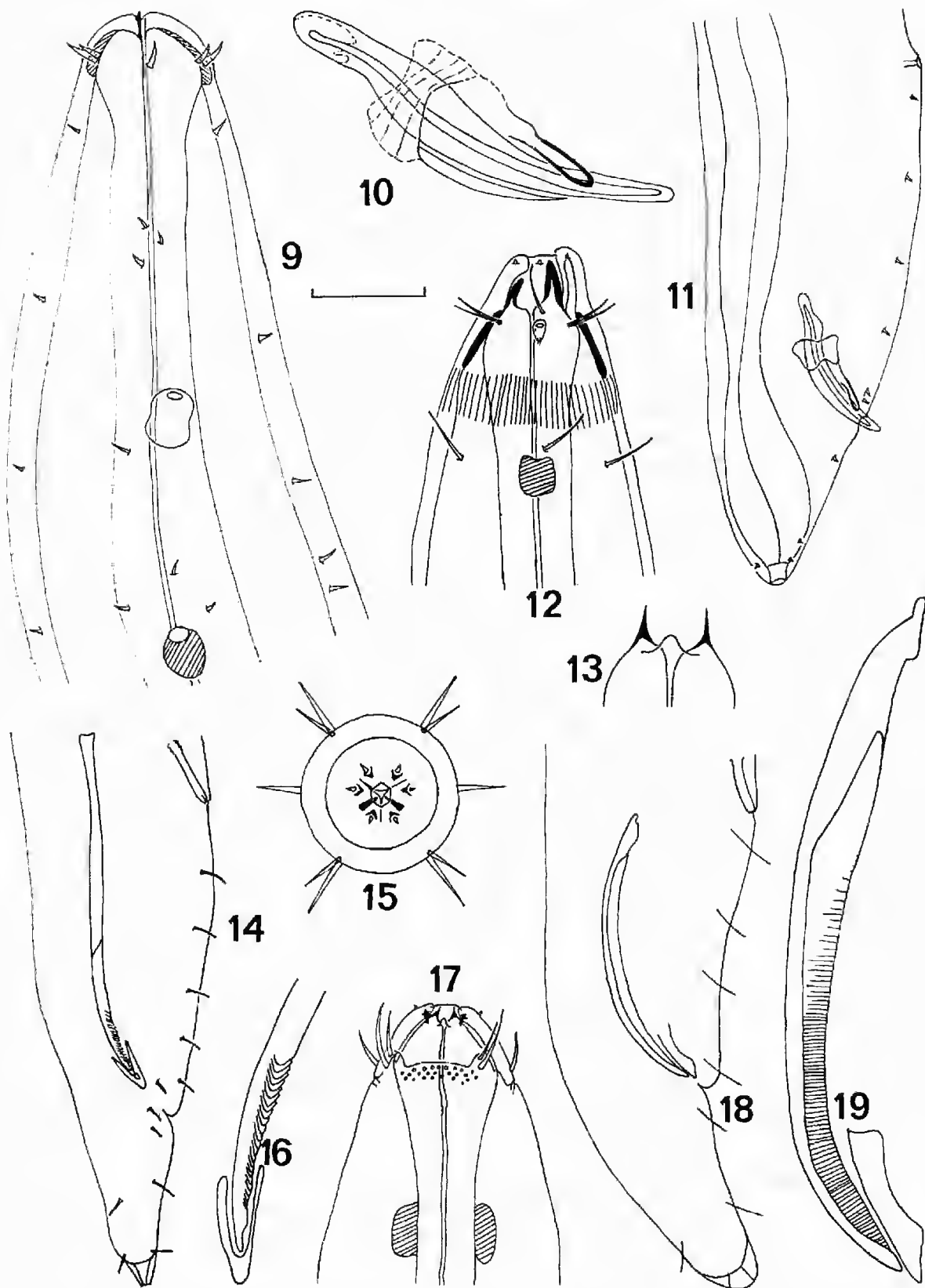
The tiny, relatively far posterior, opening of the amphid leads into a prominent irregularly shaped pouch. The eye-spots have definite lens. The nerve ring is obvious; between it and the anterior end of the body is a series of setae in regular dorso- and ventro-lateral rows but irregularly scattered on the lateral surfaces. There do not appear to be any wholly dorsal and ventral in position. No excretory pore was found.

The tail is conical, short and bluntly rounded with a series of tiny setae near the posterior end. A papillose pre-cloacal supplement is present with a series of ventro-lateral setae between it and the cloacal opening just anterior and lateral to which are two pairs of tiny setae lying close together.

The structure of the spicules and gubernaculum is difficult to establish but the spicules appear to be relatively simple with median supporting ridges or flanges. They are slightly double bent and end distally in blunt tips. The gubernaculum is most strongly developed as a rod-like process which lies lateral and ventral to the spicules, enfolding them near their distal ends. More anteriorly or proximally the gubernaculum becomes much lighter in structure and more difficult to make out but appears to expand rapidly to form large poorly sclerotized membranes (Fig. 10).

*Discussion.* This species is most similar to *Leptosomatum keiense* and *L. steineri*, both Micoletzky, 1930 and *L. ranjhui* Timm, 1960 in possessing a papillose pre-cloacal supplement. However it differs markedly in the posterior position of the amphids and eye-spots, the apparently relatively long cephalic setae, and in the shape and structure of the spicules and gubernaculum.

- Figs. 9-11. *Leptosomatum micoletzkyi*. Fig. 9.—Anterior end, lateral view; note posterior position of small amphid. Fig. 10.—Spicule and gubernaculum detail, note prominent ventro-distal rod of gubernaculum. Fig. 11.—Posterior end male.
- Figs. 12, 14, 16. *Phanoderma serratum*. Fig. 12.—Anterior end, lateral view. Fig. 14.—Posterior end male. Fig. 16.—Posterior end spicule and gubernaculum, detail.
- Figs. 13, 15, 17-19. *Paraphanoderma robynnae*. Fig. 13.—Detail of oesophageal dentition, dorsal view (sketch). Fig. 15.—Head *en face*; note rods associated with inner cephalic sense organs. Fig. 17.—Anterior end, dorsal view. Fig. 18.—Posterior end male. Fig. 19.—Spicule and gubernaculum, detail.
- (Scale = 0.02 mm in Figs. 9, 10, 12, 15, 16, 17, 19; Scale = 0.05 in Figs. 11, 14, 18.)





## Family PHANODERMATIDAE

*Phanoderma serratum* Dirlevsen, 1930

FIGS. 12, 14, 16

*Localities.* Weed and associated sand without silt on fairly exposed beach in 25 cm of water; Sarge Bay, Cape Leeuwin. Finger-like green sea-weed, in rocks awash at low tide; Bunker Bay, Geographe Bay. Weed and associated sand in hold-fasts, on exposed rocks; Goode Beach, Albany.

*Measurements* (mm)—*Males:* Body length: 3.09; 3.29; 3.42. Body breadth: 0.094; 0.110; 0.130. Oesophagus length: 0.74; 0.81; 0.78. Length of cephalic setae, long/short: 0.013/0.011; 0.013/0.011; 0.013/0.011. Cephalic capsule length: 0.030; 0.027; 0.033. Distance from anterior end of eye spots/excretory pore/nerve ring: 0.036/0.035/0.26; 0.046/0.046/0.31; 0.038/0.039/0.032. Length of spicules: 0.115; 0.155; 0.152. Length of gubernaculum: 0.039; 0.038; 0.039. Pre-cloacal supplement, length/distance anterior to cloacal opening: 0.027/0.13; 0.033/0.15; 0.033/0.13. Tail length: 0.083; 0.083; 0.083. Cloacal diameter: 0.046; 0.046; 0.052.

The head is typical (Inglis, 1962) with six buccal rods, two large ventral onchia and a small dorsal, plus a well marked, longitudinally striated region posterior to the cephalic capsule. Eye spots are present, fairly close to the posterior edge of the capsule and well anterior to the opening of the excretory pore.

The spicules are long and slim with a series of plate-like ridges on their distal ends, ends which have a slight swelling just anterior to the rounded tips. The gubernaculum is small and simple, rather like a cap round the end of the spicules. The tail is short and stoutish.

*Discussion.* This species is most easily characterized by the slim serrated spicules, the presence of eye-spots and the presence of a striated cervical capsule; all of which it has in common with *P. parafilipjevi* Allgén, 1939 (see Inglis, 1962).

It is, in fact, doubtful if these two species, *P. serratum* and *P. parafilipjevi*, can be distinguished and it should be noted that my measurement (Inglis, 1962) for the length of the male tail in *P. parafilipjevi* is wrong and should read 0.078 instead of 0.14.

Nevertheless I leave the two species distinct since the striated posterior region of the spicules of the Australian specimens is much greater than in *P. parafilipjevi*, the gubernacu-

lum is a different shape, and the dorsal onchium is shorter than the ventral in *P. serratum* but almost equal in length in *P. parafilipjevi*.

This species was originally described by Dirlevsen (1930) from Bay of Islands, New Zealand.

*Paraphanoderma robynæ* gen. et sp. nov.

FIGS. 13, 15, 17-19

*Locality.* From among sea-weed and fine sand, among rocks just awash and in rock pools; Bunker Bay, Geographe Bay.

*Measurements* (mm)—*Males:* Body length: 4.50; 4.84. Body breadth: 0.11; 0.13. Oesophagus length: 0.91; 0.94. Cephalic setae, long/short: 0.012/0.009; 0.012/0.009. Cephalic capsule, posterior diameter: 0.025; 0.035. Distance from anterior end of excretory pore/eye spots/nerve ring: 0.039/0.039/0.29; 0.034/0.044/0.30. Length of spicules: 0.127; 0.131. Length of gubernaculum: 0.027; 0.026. Pre-cloacal supplement, length/distance anterior to cloacal opening: 0.027/0.133; 0.026/0.146. Tail length: 0.102; 0.132. Cloacal diameter: 0.068; 0.079. *Females:* Body length: 5.89. Body breadth: 0.21. Oesophagus length: 1.01. Cephalic setae, long/short: 0.013/0.011. Cephalic capsule, posterior diameter: 0.026. Distance from anterior end of excretory pore/eye spot/nerve ring: 0.043/0.049/0.33. Tail length: 0.142. Anal diameter: 0.099. Distance of vulva from anterior end of body: 3.25. Size of eggs (spherical; diameter) 0.102.

The cephalic capsule is poorly developed and there is some slight dotting of the cuticle posterior to it. The mouth opening is small and hexagonal and is surrounded by six thorn-like setae which are supported by six buccal rods (Fig. 15). The outer setae are in two circles of six and four of which the more posterior four are longer. The amphid is small and typical in shape. Eye spots without lenses are present and the excretory pore opens on a level with or anterior to them. There are two poorly developed, thin, sharp, somewhat needle-like ventro-lateral onchia and a similar, but very small, dorsal onchium in the female, although its presence in the male is uncertain. The lateral cephalic setae lie slightly dorsal of the amphid and the lips of the excretory pole are prominent and slightly swollen. The tail is stout and roundish and the caudal glands lie anterior to the cloacal opening.

The spicules are fairly stout with simple alae. A simple, ruf-like pre-cloacal supplement is

present and the gubernaculum is a simple plate-like structure lying slightly ventral and lateral to the spicules (Fig. 19).

The female reproductive system is doubled, and opposed with reflexed ovaries. The uteri contain large numbers of eggs packed in two or three rows.

*Discussion.* Difficulties arise in placing this species because of the unsatisfactory descriptions of many of the type species and the diagnoses of many of the genera referred to the Phanodermatidae. Of those for which it is possible to reach some reasonable conclusions this species is most like *Phanoderma* itself and *Phanodermopsis* Ditlevsen, 1926, with a slight chance that it may resemble *Phanodermella* Kreis, 1928. However it differs most markedly from *Phanodermopsis* in the presence of a pre-cloacal supplement and eye spots and from *Phanoderma* in the extreme simplicity of the cephalic dentition and the poorly developed cephalic capsule. The description of *Phanodermella longicaudata* Kreis, 1928, the type species of *Phanodermella*, is such that it is impossible to compare it in detail but that species appears to lack onchia and I suspect that it is probably a species of *Anticomma* in which the cephalic capsule is prominent.

I therefore propose to refer the Western Australian species to a new genus, thus:

**PARAPHANODERMA** gen. nov.

Phanodermatidae: cephalic capsule poorly developed; poorly developed onchia present, two ventro-laterals needle-like and small and no or a poorly developed dorsal; eye spots present; Male: pre-cloacal supplement present; spicules alate; tail bluntly rounded.

*Type species: Paraphanoderma robynae* sp. nov.

It is just possible that *Phanodermopsis necta* Gerlach, 1957 is referable to this genus since it is not happily referable to *Phanodermopsis*.

**Family ENOPLIDAE**

***Enoplus meridionalis*** Steiner, 1921.

FIGS. 20-26

*Locality.* Weed and sand associated with hold-fasts in 30 cm water; Radar Reef, Stickland Bay, Rottneest Island.

*Measurements* (mm)—*Males:* Body length: 3.16; 3.28. Body breadth: 0.093; 0.116. Oesophagus length: 0.51; 0.52. Diameter of head: 0.045; 0.042. Length of mandibles: 0.018;

0.017. Length of cephalic setae, long/short: 0.017/0.015; 0.017/0.014. Spicule length: 0.108; 0.100. Gubernaculum length: 0.036; 0.034. Pre-cloacal supplement, length/distance anterior to cloacal opening: 0.065/0.19; 0.062/0.23. Tail length: 0.175; 0.162. Cloacal diameter: 0.078; 0.083. *Females:* Body length: 3.46; 3.72. Body breadth: 0.135; 0.127. Oesophagus length: 0.51; 0.53. Diameter of head: 0.047; 0.048. Length of mandibles: 0.018; 0.019. Tail length: 0.22; 0.24. Anal diameter: 0.079; 0.081. Distance of vulva from anterior end of body: 2.08; 2.31. Size of eggs (spherical/diameter): 0.089 (13 present); 0.087 (11 present).

The head is typical with the openings of the amphids slightly anterior to the posterior edge of the cephalic capsule and with masses of lateral pigment at the anterior end of the oesophagus.

The male tail is relatively stout and is curved ventrally in fixed specimens. There is a single, median papilla-like organ on the posterior lip of the cloacal opening which is the external expression of an internal tube (Figs. 24 & 26). There is a raised region, on which are borne two barb-like setae, about two thirds of the length of the tail posterior to the cloacal opening. The pre-cloacal supplement is slightly trumpet shaped (Fig. 23) and there is a number of prominent ventro-lateral setae between it and the cloacal opening.

The spicules are massive and roughly the same breadth throughout their lengths except towards the posterior ends where they narrow evenly to end in points which are curved outwards. As a consequence the spicules terminate posteriorly as hooks. The gubernaculum is relatively small and pear-shaped with distinct lateral flanges near the posterior end.

*Discussion.* This species was described by Steiner (1921) as a variety of *Enoplus communis* Bastian, 1865 but differs from that species markedly in the less pronounced pre-cloacal supplement and the form of the spicules. As a consequence Allgén (1947) and Wieser (1953) recognize *E. meridionalis* as a distinct species.

The specimens described above agree very well with the original description given by Steiner (1921) and the species is well characterized by the slightly trumpet-shaped supplement, the massive spicules with their hooked posterior ends, the post-cloacal papilla-like structure and the pair of hook-like setae on the tail. The structure of the gubernaculum

also appears to be characteristic and is the only discordant feature since Steiner illustrates a slightly different shape. It should be noted that the structure of the spicules was established after dissection.

This species was described originally from the Canary Islands in the North Atlantic but has since been found at Port Willunga in South Australia (Mawson, 1953) and by Chitwood (1936) from the coast of North America. Both these reports are supported by descriptions which leave little doubt that the same species was studied. *E. meridionalis* is, therefore, a very widespread species which may be cosmopolitan.

*E. meridionalis* is also reported and described from La Jolla, California by Allgén (1947) but the illustrations and descriptions are such that it is impossible to know what species was studied.

#### *Enoplus alpha* sp. nov.

FIGS. 27-31

*Locality.* Weed and sand associated with holdfasts, in 30 cm water; Radar Reef, Stickland Bay, Rottneest Island.

*Measurements* (mm)—*Males*: Body length: 2.39; 3.19. Body breadth: 0.096; 0.109. Oesophagus length: 0.43; 0.48. Diameter of head: 0.043; 0.043. Length of mandibles: 0.016; 0.017. Length of cephalic setae, long/short: 0.014/0.010; 0.014/0.010. Spicule length: 0.109; 0.149. Gubernaculum, length/breadth: 0.030/0.021; 0.038/0.024. Pre-cloacal supplement, length/distance anterior to cloacal opening: 0.029/0.11; 0.039/0.12. Tail length: 0.198; 0.202. Cloacal diameter: 0.074; 0.081.

The head is typical and the amphids open slightly anterior to the posterior edge of the cephalic capsule. Masses of pigment are present on the lateral sides of the oesophagus near the anterior end. The tail is relatively long with a distinctly raised region about half way along

its length from which two spine-like setae arise. Two papilla-like structures, on one oval base, occur on the posterior lip of the cloacal opening. The pre-cloacal supplement is simple and rod-like, at right angles to the ventral surface of the body.

The spicules are stout with "doubled" anterior ends due to an infolding of their dorsal surface (Figs. 28, 30, 31) and also bear a barb-like flange about two thirds from the anterior end. The gubernaculum is small with rounded lateral pieces in lateral view and paired median pieces which carry hair-like processes on their posterior ends.

*Discussion.* This species shows similarities to *E. benhami* Ditlevsen, 1930; *E. parallinialis* Wieser, 1953 and *E. michaelsoni* Linstow, 1896 but differs from them all in the combination of a simple rod-like pre-cloacal supplement, a pair of post-cloacal papillae, a small gubernaculum and the shape of the infolded spicules with only one barb-like plate on the ventral surface.

#### *Epacanthion georgei* sp. nov.

FIGS. 33-37

*Locality.* Beach sand in about 20 cm of water, exposed to breaker action; Cowaramup Bay.

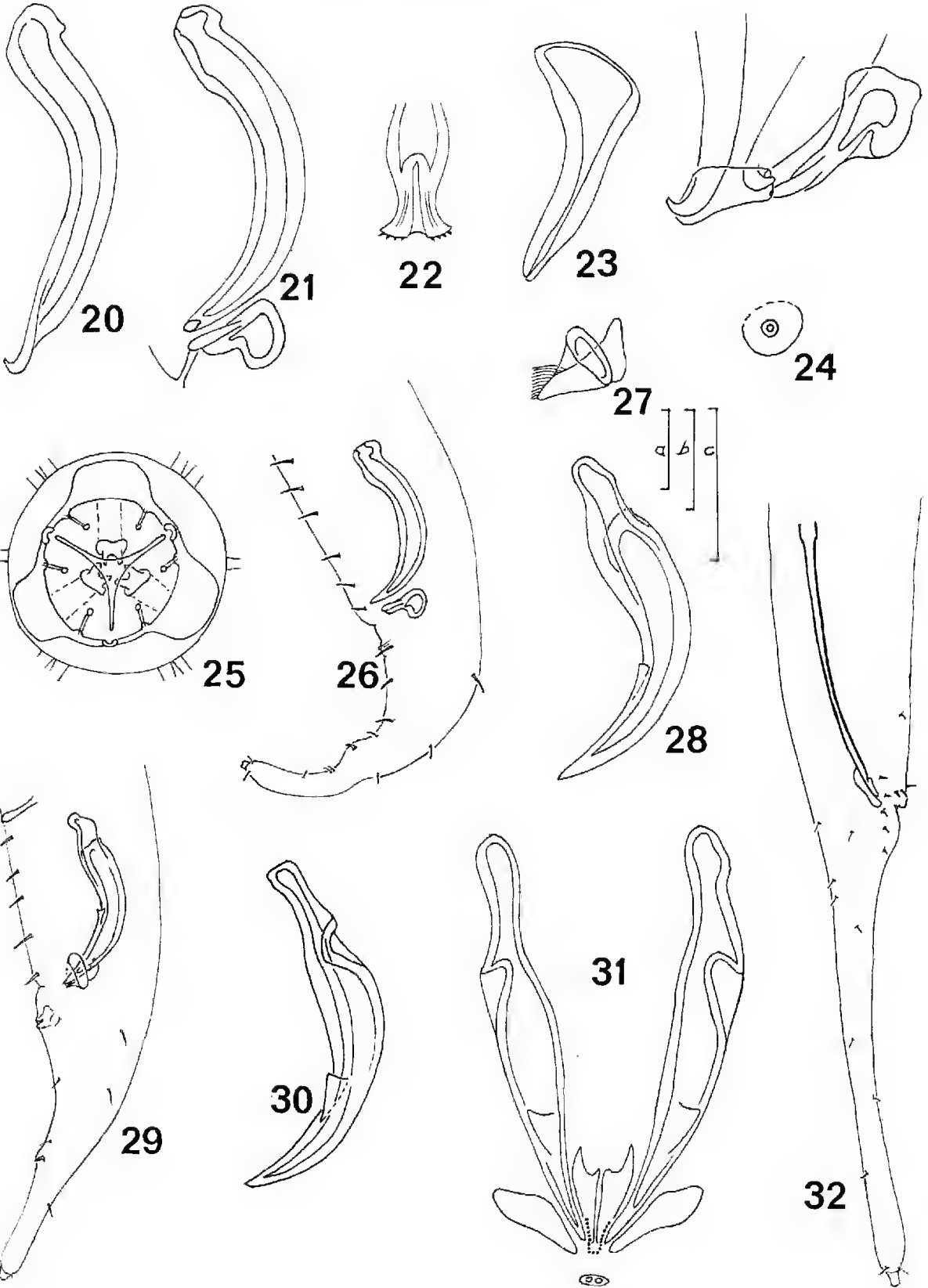
*Measurements* (mm)—*Male*: Body length: 3.28. Body breadth: 0.074. Oesophagus length: 0.72. Cephalic capsule, posterior diameter: 0.047. Length of cephalic setae, inner/outer short/outer long: 0.013/0.027/0.033. Spicule length: 0.046. Gubernaculum length: 0.029. Tail length: 0.242. Cloacal diameter: 0.049. *Females*. Body length: 3.95; 4.26; 4.43. Body breadth: 0.11; 0.092; 0.10. Oesophagus length: 0.77; 0.82; 0.87. Cephalic capsule, depth/posterior diameter: 0.029/0.055; 0.026/0.053; 0.028/0.056. Length of cephalic setae, inner/outer short/outer long: 0.017/0.017/0.039; 0.018/0.016/0.033; 0.017/

Figs. 20-26.—*Enoplus meridionalis*. Fig. 20.—Spicule, inner surface. Fig. 21.—Spicule and gubernaculum, outer surface. Fig. 22.—Distal tip pre-cloacal supplement. Fig. 23.—Pre-cloacal supplement. Fig. 24.—Oblique view posterior ends spicules and gubernaculum, with cloacal opening and post-cloacal pore-like sense organ. Fig. 25.—Head *en face*. Fig. 26.—Posterior end male.

Figs. 27-31. *Enoplus alpha*. Fig. 27.—Gubernaculum detail. Fig. 28.—Spicule, outer surface. Fig. 29.—Posterior end male. Fig. 30.—Spicule, inner surface. Fig. 31.—Spicules and gubernaculum with doubled post-cloacal sense organ, ventral view.

Fig. 32. *Prooncholaimus mawsonae*. Posterior end male.  
(Scale  $a = 0.05$  mm in Figs. 26, 29;  $b = 0.02$  in Figs. 22, 25;  $c = 0.05$  in Figs. 20, 21, 23, 24, 27, 28, 30, 31, 32.)





0.017/0.036. Length of tail: 0.312; 0.377; 0.374. Anal diameter: 0.069; 0.063; 0.066. Distance of vulva from anterior end of body: 2.13; 2.39; 2.41. Size of eggs: 0.325  $\times$  0.066 (in 4.26 mm specimen only).

The head bears three high, narrow lips with semi-lunar striations. The setae of the inner circle are fairly long while the six of the intermediate circle are very long with the four of the outer circle much shorter and lying immediately posterior to the dorso- and ventro-lateral components of the intermediate circle. The small pockets of the cephalic slits are almost wholly lateral in position while the amphids are small and typical.

The mandibular:onchial complex is represented by mandibles which appear, in optical section, to consist of two hooked rods joined by a thin central sheet of cuticle. The usual squarish blocks of dense material, developed in the outer body cuticle, lie on a level with the anterior ends of the mandibles. The onchia are subequal in size, with the dorsal slightly smaller, and lie on the level of the posterior edge of the mandibles, thus approximating the conditions described for *E. multipapillatum* (Wieser, 1959). There are no obvious onchial plates (Figs. 33-34).

In the female there is one circle of short cervical setae just posterior to the posterior edge of the cephalic capsule. The total number of these setae varies from specimen to specimen but they form six groups dorso-, and ventro-lateral and wholly lateral in position. The conditions in the male are more complex with a circle of twenty-four setae in twelve pairs lying posterior to the outer cephalic setae. About the same distance posterior to this circle of cervical setae as this circle is from the anterior end of the body lies another circle consisting of setae arranged in roughly the same twelve groups but there are not always two setae per group. Almost immediately posterior to this circle again is a series of four patches of about ten setae dorso- and ventro-lateral in position. Immediately posterior to these patches is yet another circle of setae arranged roughly in twelve groups (Fig. 37). Setae become scarcer on the body posterior to this level but occur sporadically over the length of the body.

The tail is long and slim in both sexes and there is no pre-cloacal supplement or other modifications on the male. The spicules are short and stout with expanded proximal ends and there is a small plate-like gubernaculum.

*Discussion.* This species is characterized by the distribution of the cervical setae, by the short, stout spicules in association with the long slim tail, the small gubernaculum and the absence of any pre-cloacal supplement(s). In the characters of the male tail it resembles most closely *E. oliffi* Inglis, 1966 and *E. multipapillatum* (Wieser, 1959) but differs from both in the spicules, which are not serrated posteriorly, and in the number and arrangement of the cervical setae. In addition *E. oliffi* lacks a gubernaculum while in *E. multipapillatum* the gubernaculum has a slight, hook-like apophysis.

#### Family ENCHELIDIIDAE

#### *Eurystomina eurylaima* (Ditlevsen, 1930).

FIGS. 38-40

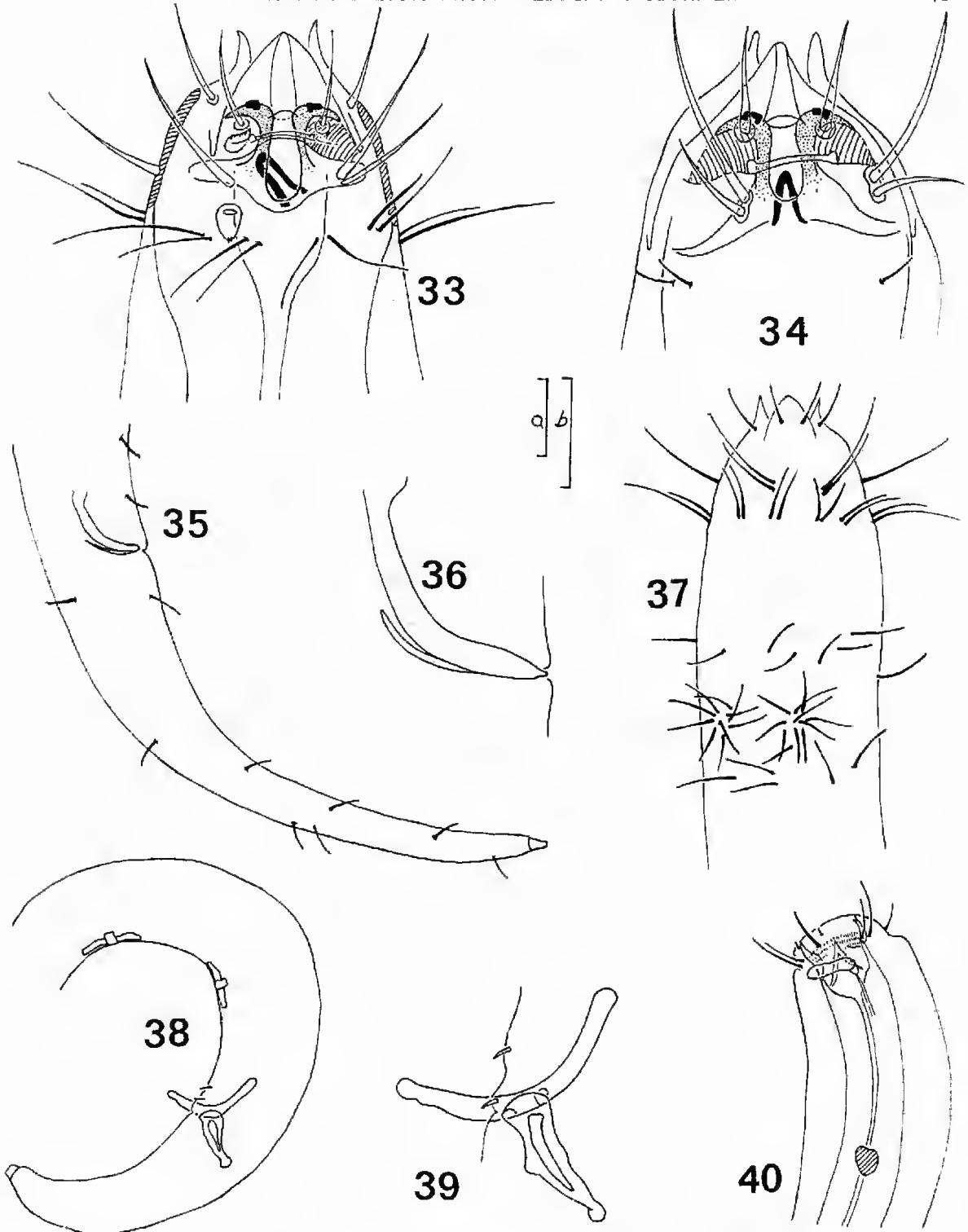
*Marionella eurylaima* Ditlevsen, 1930.

*Localities.* Among gravel and weed in 5 metres of water; off Woodman's Point in Cockburn Sound. Weed and sand in 1 metre of water; Radar Reef, Strickland Bay, Rottneest Island.

*Measurements* (mm)—*Male*: Body length: 2.13; 3.94. Body breadth: 0.040; 0.049. Oesophagus length: 0.55; 0.65. Length of cephalic setae, long/short: 0.008/0.005. Buccal cavity, total length/breadth anterior chamber: 0.013/0.005; 0.016/0.009. Distance from anterior end of eye spot/nerve ring: 0.044/0.205; 0.048/0.216. Chordal length of spicules: 0.046; 0.059. Gubernaculum length: 0.027; 0.029. Pre-cloacal supplements, distance anterior to cloacal opening, anterior/posterior: 0.11/0.054; 0.13/0.081. Tail length: 0.099; 0.113. Cloacal diameter: 0.035; 0.043.

The head is typical with three rings of small denticles in the buccal cavity of which the posterior ring is incomplete, lacking denticles opposite the right ventro-lateral onchium. The amphids are in their typical dorso-lateral position, with the nerves entering them from the lateral end, and an eye spot is present. The six cephalic sense organs of the inner circle are slightly setose and in the outer ring of ten setae six are longer than the remaining four.

The tail is relatively short and the usual two pre-cloacal supplements are present with anteriorly and posteriorly directed "wings". The spicules are evenly curved and of an even width throughout their lengths except for a slight constriction before the distal tip which is rounded and bulb-like. The gubernaculum is



Figs. 33-37. *Epacanthion georgei*. Fig. 33.—Male head, ventro-lateral view. Fig. 34.—Female head, dorsal view. Fig. 35.—Posterior end male. Fig. 36.—Spicule and gubernaculum. Fig. 37.—Anterior end male showing distribution of cephalic and cervical setae.

Figs. 38-40. *Eurystomina eurylaima*. Fig. 38.—Posterior end male. Fig. 39.—Spicule and gubernaculum. Fig. 40.—Anterior end, lateral view.  
(Scale a = 0.02 mm in Fig. 37; b = 0.02 in Figs. 33, 34, 36, 39, 40; b = 0.05 in Figs. 35, 38.)

prominent, roughly triangular in lateral outline and ends in a rounded, slightly bulb-like tip.

*Discussion.* In his original description Ditlevsen (1930) was unable to find any cephalic setae, amphids or eye-spots and the pre-cloacal supplements lacked "wings". This latter feature has been reported from other species as an abnormality and the remaining "missing" structures could easily have been lost during preservation, as Ditlevsen himself points out.

The similarities between the specimens described here and the description given by Ditlevsen are great, with the same shape of spicule with its posterior swelling and a very similar gubernaculum. The greatly discordant feature is, however, in the lengths of the specimens since Ditlevsen's male was 6.3 mm long. I assume that my specimens are young males since all the measurements are roughly in proportion.

It is perhaps worth drawing attention to and stressing the fact that on the structure of the head it would be impossible to distinguish this species from many others of the genus and that I am sure that because of the obviously poor condition of his specimens (see Ditlevsen's figure 37) Ditlevsen overlooked the third row of denticles. I have stressed elsewhere that the structure of the male reproductive organs, spicules and gubernaculum, are very useful in delimiting species within this genus (Inglis, 1962). Nevertheless I am prepared to accept the point made by Wieser and Hopper (1967) that I was over enthusiastic since, obviously, other features (which had been stressed before) are of some value, just as the male characters (which had not been stressed before) are clearly of great value. But Wieser and Hopper use, as an example of the weakness of my argument, *E. minutisculae* Chitwood, 1951, which they redescribe. But I find it impossible to accept that the species they redescribe is the same as that described originally by Chitwood in 1951 although it is very like the species described by Timm (1952) under that name. On the other hand it looks considerably more like the specimen described by Chitwood as *E. americana* in 1936.

It is inconceivable to me that Chitwood, even at his worst (which is usually better than most bests) could have drawn the massive square gubernaculum of *E. minutisculae* in mistake for the slim structure described by Wieser and Hopper and by Timm. I further cannot agree that the differences between the

gubernacula of the two species as illustrated by Chitwood are slight, always accepting that such a judgement is very much a matter of opinion. On the other hand if the slight differences, which run to a totally different outline, could be due to errors in observation it is equally feasible, and to me much more likely, that the denticles in the buccal cavity were misinterpreted. No matter which answer we accept there is an error in the descriptions somewhere, as Wieser and Hopper imply.

#### Family ONCHOLAIMIDAE

#### *Proochoilaimus mawsonae* sp. nov.

FIGS. 32, 41-43

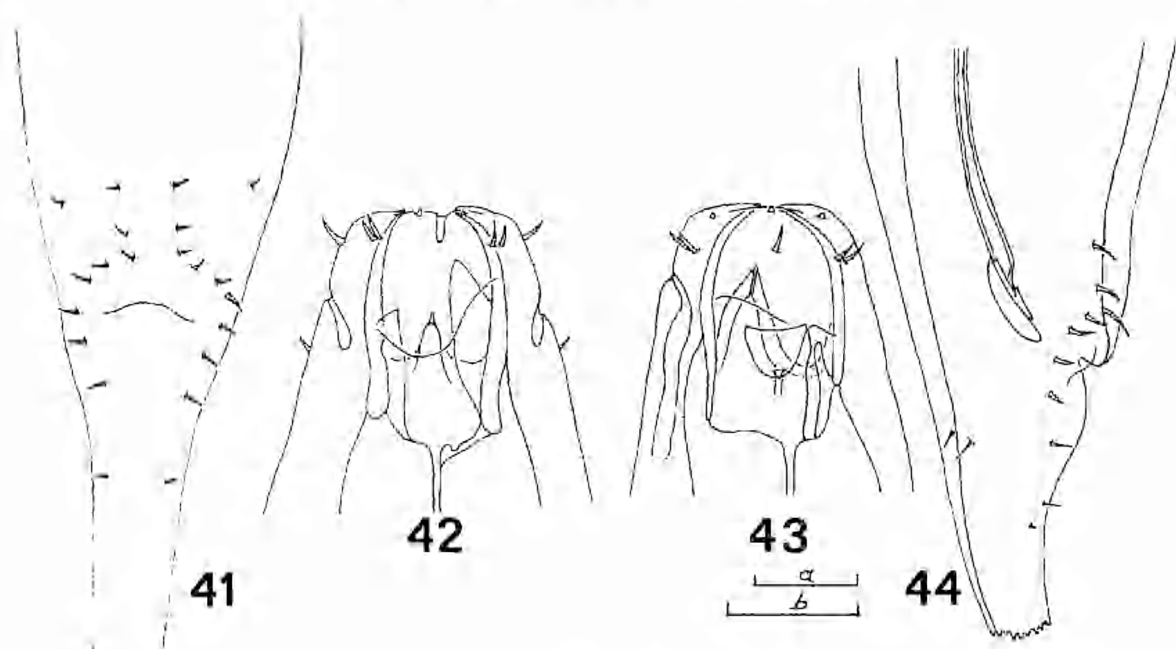
*Locality.* Collected from the water filters of the sea-water aquarium in the Zoological Department, University of Western Australia.

*Measurements* (mm)—*Males*: Body length: 2.54; 2.85; 3.44. Body breadth: 0.068; 0.066; 0.079. Oesophagus length: 0.43; 0.44; 0.47. Length of cephalic setae: 0.004; 0.005; 0.004. Buccal cavity, length/breadth: 0.034/0.017; 0.038/0.017; 0.036/0.019. Distance from anterior end of excretory pore/nerve ring: 0.011/0.22; 0.010/0.23; 0.012/0.23. Spicule length: 0.085; 0.096; 0.083. Gubernaculum length: 0.017; 0.015; 0.012. Tail length: 0.13; 0.14; 0.14. Cloacal diameter: 0.029; 0.030; 0.030. *Females*. Body length: 3.25; 3.50; 3.51. Body breadth: 0.086; 0.089; 0.089. Oesophagus length: 0.44; 0.46; 0.48. Length of cephalic setae: 0.005; 0.006; 0.006. Buccal cavity, length/breadth: 0.043/0.019; 0.042/0.019; 0.043/0.018. Distance from the anterior end of excretory pore/nerve ring: 0.012/0.22; 0.021/0.23; 0.023/0.23. Tail length: 0.15; 0.18; 0.17. Anal diameter: 0.035; 0.040; 0.039. Distance of vulva from anterior end of body: 2.44; 2.54; 2.73. Size of eggs: 0.066 × 0.066 and 0.059 × 0.067.

This species is typical of the genus with slightly subequal cephalic setae, and a large buccal cavity in which the left ventro-lateral onchium is larger than the other two which are equal. The usual bubble-like cells are present but variable, particularly in the males where they were almost not present in some specimens.

The tail is long and slim in both sexes and the posterior lip of the cloacal opening in the male is not cut back relative to the anterior lip. The cloacal opening is usually surrounded by a series of six pairs of setae. The spicules are





Figs. 41-44. *Prooncholaimus mawsonae*. Fig. 41.—Male cloacal region ventral view. Fig. 42.—Head, ventral view. Fig. 43.—Head, lateral view. Fig. 44.—Male cloacal region, lateral view. (Scale a = 0.02 mm in Figs. 41, 44; b = 0.02 in Figs. 42, 43.)

typical with barbed posterior ends in which the barb is not set-off from the shaft of the spicules by a distinct "handle" (Fig. 44). The gubernaculum is a rounded mass.

The female reproductive system is single with a reflexed ovary.

*Discussion.* The form of the spicule which has no distinctly set-off barb eliminates *P. banyulensis* Inglis, 1962 and *P. hastatus* Wieser and Hopper, 1967 from consideration and leaves *P. eberthi* (Filipjev, 1918), *P. ornatus* Kreis, 1932, *P. aransas* Chitwood, 1951 and *P. megastoma* (Eberth, 1863). Wieser and Hopper (1967) treat *P. mediterraneus* Schuurmans Stekhoven, 1943 and *P. megastoma* var. *neapolitanus* Micoletzky, 1924 as synonyms of *P. megastoma*. With this I agree, also with their treatment of three species named by Kreis (1932) as *species inquirendae*.

The present species differs from *P. ornatus* and *P. aransas* in the barbed spicules, and differs from *P. eberthi* in the sharply pointed posterior end to the barb of the spicule (blunt in Filipjev's illustration, Plate 4, Fig. 27d) and the short gubernaculum (long and slim in Filipjev's Fig.). In addition to the slight difference in the shape of the posterior end of the spicule this species differs from *P. banyulensis* in the greater number of peri-cloacal setae, the

shorter cephalic setae (0.004-5 against 0.007), the poorly developed "balloonings", and the relatively shorter spicules.

This leaves *P. megastoma* to be considered, a species reported by Mawson (1957) from South Australia. The original description of this species is poor but if we accept that *P. mediterraneus* is the same species, the Western Australian species differs from it in the hooked posterior end to the spicule as well as the length of the spicules which, from Schuurmans Stekhoven's (1950) figure of the male tail (Fig. 28D), must be about 0.26 mm long. Here they are only 0.083-0.096 mm long, although the total body lengths are comparable.

It is difficult to be sure about any of this because the barb on the spicules is not pronounced and could have been overlooked. Until there is further information this species must be considered different from *P. megastoma* and also from the species recorded under the same name by Mawson (1957).

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